

## WHAT IS CLAIMED IS:

1. A method for managing voice channels that are carried over a plurality of point-to-multipoint optical networks, wherein each of said point-to-multipoint optical networks is connected to one of a plurality of access modules, each access module including a central office (CO) interface, a packet network interface, and at least one optical line terminal (OLT) that is optically connected to a plurality of optical network units (ONUs) by a point-to-multipoint optical link, said plurality of access modules being connected by a packet network connection through said packet network interfaces, said method comprising:  
 distributing demand for voice channels among a plurality of said CO interfaces by establishing voice channels that utilize said packet network connection to access at least one of said CO interfaces.

2. The method of claim 1 wherein said step of distributing demand for voice channels among a plurality of CO interfaces includes steps of:  
 receiving channel utilization information from said plurality of CO interfaces; and  
 using said channel utilization information from said plurality of CO interfaces to determine how to distribute voice channels among said CO interfaces.

3. The method of claim 1 wherein said step of distributing demand for voice channels among a plurality of CO interfaces includes steps of:  
 receiving channel utilization information from a plurality of ONUs that are connected to said plurality of point-to-multipoint optical networks; and  
 using said channel utilization information from said plurality of ONUs to determine how to distribute voice channels among said CO interfaces.

4. The method of claim 1 wherein said step of distributing demand for voice channels among a plurality of CO interfaces includes steps of:

receiving channel utilization information from said plurality of CO interfaces;

5 receiving channel utilization information from a plurality of ONUs that are connected to said plurality of point-to-multipoint optical networks; and

using said channel utilization information from said plurality of CO interfaces and said channel utilization information from said plurality of ONUs to distribute voice channels such that a minimum threshold of available channel  
10 capacity is maintained at each of said CO interfaces.

5. The method of claim 1 further including a step of establishing a voice channel having a transmission path that includes an optical link between a first ONU and a first access module, a packet network connection that connects said  
15 first access module to a second access module, and a CO interface that is part of said second access module, wherein said first and second access modules are included within said plurality of access modules.

6. The method of claim 5 further including a step of transmitting voice  
20 information between said first ONU and said CO interface that is part of said second access module via said optical link between said first ONU and said first access module and via said packet network connection that connects said first access module and said second access module.

25 7. The method of claim 6 wherein said voice information is transmitted in Internet protocol (IP) packets between said first ONU and said CO interface that is part of said second access module.



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9. A method for managing voice channels that are carried over a plurality of point-to-multipoint optical networks comprising:

distributing demand for voice channels that connect through a central office (CO) interface among a plurality of CO interfaces that service said plurality of point-to-multipoint optical networks, wherein said plurality of CO interfaces are connected by a packet network connection; and

establishing voice channels having transmission paths that include one of said CO interfaces, said packet network connection, and at least one of said plurality of point-to-multipoint optical networks.

10. The method of claim 9 wherein said step of distributing demand for voice channels among a plurality of CO interfaces includes steps of:

receiving channel utilization information from said plurality of CO interfaces;

receiving channel utilization information from a plurality of ONUs that are connected to said plurality of point-to-multipoint optical networks; and

using said channel utilization information from said plurality of CO interfaces and said channel utilization information from said plurality of ONUs to determine how to distribute voice channels among said CO interfaces.

11. The method of claim 9 wherein said step of distributing demand for voice channels among a plurality of CO interfaces includes steps of:

receiving channel utilization information from said plurality of CO interfaces;

receiving channel utilization information from a plurality of ONUs that are connected to said plurality of point-to-multipoint optical networks; and

using said channel utilization information from said plurality of CO interfaces and said channel utilization information from said plurality of ONUs to distribute voice channels such that a minimum threshold of available channel capacity is maintained at each of said CO interfaces.

12. The method of claim 9 wherein said step of establishing voice channels includes a step of establishing IP addresses for voice-carrying IP packets which cause transmission paths to include one of said CO interfaces, said packet network connection, and at least one of said plurality of point-to-multipoint optical  
5 networks.

13. A system for managing voice channels that are carried over a plurality of point-to-multipoint optical networks, wherein each of said point-to-multipoint optical networks is connected to one of a plurality of access modules, each access module including a central office (CO) interface, a packet network interface, and at least one optical line terminal (OLT) that is optically connected to a plurality of optical network units (ONUs) by a point-to-multipoint optical link, said plurality of access modules being connected by a packet network connection through said packet network interfaces, said system comprising:

means for distributing demand for voice channels among a plurality of said CO interfaces by establishing voice channels that utilize said packet network connection to access at least one of said CO interfaces.

14. The system of claim 13 wherein said means for distributing demand for voice channels among a plurality of CO interfaces includes means for:

receiving channel utilization information from said plurality of CO interfaces; and

using said channel utilization information from said plurality of CO interfaces to determine how to distribute voice channels among said CO interfaces.

15. The system of claim 13 wherein said means for distributing demand for voice channels among a plurality of CO interfaces includes means for:

receiving channel utilization information from a plurality of ONUs that are connected to said plurality of point-to-multipoint optical networks; and

using said channel utilization information from said plurality of ONUs to determine how to distribute voice channels among said CO interfaces.

16. The system of claim 13 wherein said means for distributing demand for voice channels among a plurality of CO interfaces includes means for:

receiving channel utilization information from said plurality of CO interfaces;

5 receiving channel utilization information from a plurality of ONUs that are connected to said plurality of point-to-multipoint optical networks; and

using said channel utilization information from said plurality of CO interfaces and said channel utilization information from said plurality of ONUs to distribute voice channels such that a minimum threshold of available channel  
10 capacity is maintained at each of said CO interfaces.

17. The system of claim 13 further including means for establishing a voice channel having a transmission path that includes an optical link between a first ONU and a first access module, a packet network connection that connects said  
15 first access module to a second access module, and a CO interface that is part of said second access module, wherein said first and second access modules are included within said plurality of access modules.

18. The system of claim 17 further including means for transmitting voice  
20 information between said first ONU and said CO interface that is part of said second access module via said optical link between said first ONU and said first access module and via said packet network connection that connects said first access module and said second access module.

25 19. The system of claim 18 wherein said voice information is transmitted in Internet protocol (IP) packets between said first ONU and said CO interface that is part of said second access module.

20. The system of claim 13 wherein said means for distributing demand for voice channels among a plurality of CO interfaces includes means for establishing IP addresses for voice-carrying IP packets which cause voice channels to utilize said packet network connection between two of said access
- 5 modules.

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21. A system for managing voice channels that are carried over a plurality of point-to-multipoint optical networks comprising:

means for distributing demand for voice channels, that connect through a central office (CO) interface, among a plurality of CO interfaces that service said plurality of point-to-multipoint optical networks, wherein said plurality of CO  
5 interfaces are connected by a packet network connection; and

means for establishing voice channels having transmission paths that include one of said CO interfaces, said packet network connection, and at least one of said plurality of point-to-multipoint optical networks.

10 22. The system of claim 21 wherein said means for distributing demand for voice channels among a plurality of CO interfaces includes means for:

receiving channel utilization information from said plurality of CO  
interfaces;

15 receiving channel utilization information from a plurality of ONUs that are connected to said plurality of point-to-multipoint optical networks; and

using said channel utilization information from said plurality of CO  
interfaces and said channel utilization information from said plurality of ONUs to  
determine how to distribute voice channels among said CO interfaces.

20 23. The system of claim 21 wherein said means for distributing demand for voice channels among a plurality of CO interfaces includes means for:

receiving channel utilization information from said plurality of CO  
interfaces;

25 receiving channel utilization information from a plurality of ONUs that are connected to said plurality of point-to-multipoint optical networks; and

using said channel utilization information from said plurality of CO  
interfaces and said channel utilization information from said plurality of ONUs to  
distribute voice channels such that a minimum threshold of available channel  
30 capacity is maintained at each of said CO interfaces.

24. The system of claim 21 wherein said means for establishing voice channels includes means for establishing IP addresses for voice-carrying IP packets which cause transmission paths to include one of said CO interfaces, said packet network connection, and at least one of said plurality of point-to-
- 5 multipoint optical networks.

25. A system for managing voice channels that are carried over point-to-multipoint optical networks comprising:

a plurality of access modules, wherein each access module aggregates a plurality of point-to-multipoint optical networks;

5 a packet network connection that links said plurality of access modules to each other;

each of said plurality of access modules including:

a CO interface that links voice channels to a CO;

10 a plurality of point-to-multipoint optical networks with each point-to-multipoint optical network including an optical line terminal (OLT) that is optically connected to a plurality of optical network units (ONUs) via an OLT-specific point-to-multipoint optical link; and

15 a packet network interface that links said access module to said packet network connection; and

20 means, associated with said plurality of access modules, for establishing a voice channel having a transmission path that includes an ONU that is connected to a first access module, said packet network connection, and a CO interface of a second access module, wherein said first and second access modules are included within said plurality of access modules.

26. The system of claim 25 wherein said means for establishing a voice channel includes means for distributing demand for voice channels among said plurality of CO interfaces so that the total capacity of said plurality of CO  
25 interfaces is available to support voice channel demand for any of said ONUs.

27. The system of claim 25 wherein said means for establishing a voice channel includes means for distributing demand for voice channels at the CO interface of said first access module to the CO interface of said second access module.

28. The system of claim 25 wherein said means for establishing a voice channel includes means for distributing demand for voice channels among said plurality of CO interfaces so that a minimum threshold of available channel capacity is maintained at each of said CO interfaces.

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29. The system of claim 25 wherein said means for establishing a voice channel includes circuit network logic for determining which of said plurality of CO interfaces should be utilized to establish a new voice channel.

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30. The system of claim 29 wherein said circuit network logic receives channel utilization information from said plurality of CO interfaces.

31. The system of claim 29 wherein said circuit network logic receives channel utilization information from said ONUs.

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32. The system of claim 25 wherein said means for establishing a voice channel includes packet network logic for establishing protocol addresses which cause said transmission path to include said ONU that is connected to said first access module, said packet network connection, and said CO interface of said second access module.

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33. The system of claim 25 wherein voice information carried within said established voice channel is carried in Internet protocol (IP) packets between said ONU that is connected to said first access module and said CO interface of said second access module.

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